

What is claimed is:

- 1 1. A method of fabricating a piezoelectric film having a patterned electrode deposited on a
2 substrate, the electrode having an edge with a height, comprising the step of
3 reducing or eliminating the height of the edge, wherein a weakening effect at the
4 edge is diminished.
- 1 2. The method of claim 1, wherein the piezoelectric film is selected from the group
2 consisting of:
 - 3 a) aluminum nitride; and
 - 4 b) zinc oxide.
- 1 3. The method of claim 1, wherein the patterned electrode is selected from the group
2 consisting of aluminum and titanium.
- 1 4. The method of claim 1 wherein the substrate is selected from the group consisting of
2 silicon and gallium arsenide.
- 1 5. The method of claim 1, wherein the step of reducing or eliminating the height of the
2 edge comprises the substeps of:
 - 3 a) depositing a non-conducting layer on the patterned electrode and the
4 substrate; and
 - 5 b) planarizing the non-conducting layer such that the non-conducting layer
6 is of a same height as the patterned electrode.
- 1 6. The method of claim 5, wherein substep (b) is achieved using chemical mechanical
2 polishing.
- 1 7. The method of claim 5, wherein substep (b) is achieved using polymer planarization.
- 1 8. The method of claim 5, wherein step (b) is achieved using reflow and lift-off.
- 1 9. The method of claim 5, wherein the non-conducting layer has a low dielectric constant.

- 1 10. The method of claim 5, wherein the non-conducting layer is SiO₂.
- 1 11. The method of claim 1, wherein the step of reducing or eliminating the height of the
2 edge results in a stair-step shaped electrode.
- 1 12. The method of claim 11, wherein the step of reducing or eliminating the height of the
2 edge comprises the substeps of:
 - 3 a) depositing a plurality of conducting layers on the substrate wherein
4 alternate layers are composed of a first conducting material and
5 adjacent layers are composed of a conducting material which is
6 different from the first conducting material such that adjacent layers
7 have a different etch profile from each other;
 - 8 b) selectively laterally etching a first conducting layer;
 - 9 c) selectively laterally etching a second conducting layer directly below
10 said first conducting layer; and
 - 11 d) stopping step (c) at a point where said second conducting layer is etched
12 less than said first conducting layer; and
 - 13 e) repeating steps (b) through (d) for any additional conducting layers;
14 such that a stair-step electrode is formed.
- 1 13. The method of claim 12, wherein said alternating conducting layers are composed of
2 titanium and aluminum.
- 1 14. The method of claim 1, wherein the step of reducing or eliminating the height of the
2 edge results in a dome-shaped electrode.
- 1 15. The method of claim 14, wherein the step of reducing or eliminating the height of the
2 edge comprises the substeps of:
 - 3 a) depositing a resist layer on an electrode layer;
 - 4 b) shaping said resist layer into a dome-shaped drop; and

5 c) etching the resist layer and the electrode layer until said electrode layer is
6 shaped like a dome.

1 16. The method of claim 1, wherein the step of reducing or eliminating the height of the
2 edge comprises the substeps of:

3 a) depositing a non-conducting layer on the substrate;

4 b) patterning the non-conducting layer such that a pattern of said non-
5 conducting material is identical to a pattern desired for the
6 electrode;

7 c) depositing a plurality of layers on said non-conducting layer;

8 d) depositing a masking film on a backside of the substrate;

9 e) patterning the masking film;

10 f) etching the backside of the substrate until the non-conducting layer is
11 reached; and

12 g) etching a portion of the conducting layers which are not masked by the
13 non-conducting layer.

1 17. The method of claim 16, wherein the non-conducting layer has a low dielectric
2 constant.

1 18. The method of claim 16, wherein the non-conducting layer is SiO₂.